THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR Kenny Adams

TITLE OF THESIS The Effect of Distance on Migration Flows

DEGREE FOR WHICH THESIS WAS PRESENTED Master of Arts

YEAR THIS DEGREE GRANTED 1975

THE UNIVERSITY OF ALBERTA

THE EFFECT OF DISTANCE ON MIGRATION FLOWS

by

© KENNY ADAMS

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

IN

ECONOMICS

DEPARTMENT OF ECONOMICS

EDMONTON, ALBERTA

SPRING, 1975

75-3

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Effect of Distance on Migration Flows submitted by Kenny Adams in partial fulfilment of the requirements for the degree of Master of Arts

ACKNOWLEDGEMENTS

Special thanks are due to Professor B. McKellips for kindly consenting to supervise my work on this thesis and for his interest in the study. His suggestions of ways to improve my work are greatly appreciated. Thanks are also due to Professors C. Nunn and D. Richards for their helpful comments.

The financial assistance provided by the University of Alberta is gratefully acknowledged and greatly appreciated.

Miss Linda Chipchura did a remarkable job of typing the thesis for which I am deeply grateful.

Finally I would like to thank Joan for her encouragement and insistence that I complete this work.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Many studies[1] of migration behavior have focused on "explaining" gross migration flows between pairs of geographical areas, usually metropolitan areas, states or provinces.[2] The most common explanatory variables used in these studies are income differentials, unemployment differentials and distances between the pairs of geographical areas. These are then related to the dependent variable, gross migration flows between the pairs expressed relative to the population sizes of the

---

[1]Among these studies are T. J. Courchene, "Interprovincial Migration and Economic Adjustment". Canadian Journal of Economics, November 1970, pp. 550-76. L. Gallaway, R. Gilbert and P. Smith, "The Economics of Labor Mobility: An Empirical Analysis." Western Economic Journal, June 1967. pp. 211-23. P. Nelson, "Migration, Real Income and Information." Journal of Regional Science, Spring 1959. pp. 43-74. Aba Schwartz, "Interpreting the Effect of Distance on Migration." Journal of Policical Economy, September/October 1973. pp. 1153-69. J. Vanderkamp, "Migration Flows, Their Determinants and the Effects of Return Migration." Journal of Political Economy, September/October 1971. pp. 1012-31.

[2]The U.S. Bureau of the Census estimates of gross migration flows are based on a twenty five percent sample of 1960 respondents. These estimates are of migrant streams consisting of persons who resided in a different SMSA in 1960 than in 1955. No intermediate, return or seasonal moves are identified. See U.S. Census of Population: 1960, Subject Reports, Mobility for Metropolitan Areas. Final Report PC (2) - 2C. (Washington, D. C., Government Printing Office 1963).

In the Vanderkamp study, migration data are derived from family allowance transfers between provinces made available by the Canadian Department of National Health and Welfare. The transfers are recorded on a monthly basis and used as annual sums over the twenty year period, 1947 - 1966.

sending and receiving areas in some fashion, using a variety of functional forms, of which the modified gravity model is the most common.[3]

The role played by the distance variable in the models used in these studies is puzzling for at least two reasons. First, estimates of the elasticity of gross migration with respect to distance invariably seem to be extraordinarily high. Second, estimates of this same elasticity seem to be particularly sensitive to the choice of the particular group of geographical areas between pairs of which gross migration flows are to be "explained."

The elasticity of gross migration with respect to distance is often found to be in the vicinity of unity, and sometimes is estimated to be much larger than that. In the Nelson study, the distance elasticity of migration is 1.71, and in Courchene's study it is 0.933.[4] Unitary elasticity means that a 10% increase in distance between two areas will be associated with a 10% reduction in the gross migration flow between these areas, other things the same. Or put another way, it would appear that if migrants have to travel 1100 miles rather than 1000 miles, then this by itself would be enough to deter 10% of them from travelling that additional 100 miles. It is hard to believe that it really costs all that much more to travel 1100 miles rather than 1000 miles, and at the very least it would appear to be rather difficult to account for these

---

[3]See Chapter IV. In the gravity models, in fact, populations in the sending and receiving areas appear as independent variables.

[4]These elasticities are obtained from estimates of the regression coefficients in the respective studies. The equations are log linear. Courchene estimates eleven equations using Census data. For the purpose of this paper, the relevant equation is equation 11. Estimates for the Gallaway and Vanderkamp studies cannot be computed because of the difficulty (impossibility?) of unravelling the data.

large elasticities on the grounds that direct moving costs or indirect moving costs in the form of foregone earnings while in transit, increase with distance.

The estimates of the distance elasticities also vary substantially in value across studies, as is evident from the examples given above. The values of these elasticities seem to depend on the particular group of geographical areas between pairs of which gross migration flows are to be "explained." Sometimes, even in the same study, there is striking variation in the estimates of the distance elasticity when regressions are run over different groups of geographical areas. This suggests that different structures apply to the different groupings of geographical areas; in particular, it suggests that the deterrent effect of distance is different in different groupings of geographical areas. On the surface at least, this would appear on _a priori_ grounds to be implausable.[5]

In spite of the differences in the estimates of the distance elasticity of gross migration in these studies, the interpretations and policy conclusions are similar. These elasticities are interpreted to mean that migration is impeded by distance. Various reasons, other than direct and indirect moving costs which increase with distance, have been advanced to account for the size of the distance elasticities: insufficient reliable information about job opportunities and social conditions in distant areas; the preference to remain close to relatives and friends; and uncertainty about conditions in distant areas may prevent people from making long moves in order to obtain better economic opportunities.

---

[5]For example, see the Schwartz study (1973) Table 1.

The distance variable is considered to be a proxy for these factors which are viewed as being quantitatively more important than the direct and indirect costs associated with moving.[6]

Government subsidization of migration has been suggested as a means of neutralizing the deterrent effect of distance on migration. Vanderkamp recommends mobility assistance:

> "These results imply that there is a very high potential rate of return to mobility policy. Such a policy may increase the rate of response to existing opportunities by reducing the uncertainty through information agencies, by making sources of financing available, and by reducing the psychic moving costs through aid with moving and settling problems."[7]

The potential high rate of return presumably stems from the idea that there is relatively more under-investment in long distance moves than short distance moves on the part of the labor force. Migration is particularly inefficient with respect to the under-investment in long distance moves. If migration is inefficient, government subsidization may be justified. But, migration may, in fact, be efficient if migrants' aversion to distance is due to the fact that there are equally good economic opportunities nearer to home than in the more distant areas. In other words, if migrants do not move further than makes economic sense and the best opportunities are close to home, then migration will be efficient despite the fact that there are few long distance moves, and there will be no need for government intervention. Yet, distance will still appear as a strong deterrent to migration in

---

[6]Nelson includes a "relatives and friends multiplier." "Relatives and friends are the most important source of job information at a distance only because they are the most important source of job information in the local labor market . . ." p. 57.

[7]Vanderkamp. "Migration Flows . . ." p. 1026.

empirical studies, given how the models used in these studies are usually formulated.

Several factors are taken into consideration before the decision to move to a certain destination is made. One of these factors is the distance between the area of origin and intended destinations. Chapter II is a criticism of selected studies of migration. The selection is far from exhaustive, and the criticism of the studies is also not exhaustive. The major concern in this chapter is the interpretation of the distance coefficients.

The effect of distance on migration behavior is not simple or straightforward. In fact, there is no necessary relationship between migration and distance per se, but the relationship between migration and distance depends on an auxiliary relationship that expresses the accumulated alternative opportunities between the origin and destination as a function of distance. Chapter III develops the theoretical framework within which the effect of distance on migration flows should be considered.

In Chapter IV, a prototype of the gravity model is presented. Gross migration flows among 36 large Standard Metropolitan Statistical Areas in the United States between 1955 and 1960 are analyzed using income and distance data.

Chapter V provides a summary and discusses the policy implications of the results.

CHAPTER II

INTERPRETATION OF THE EFFECT OF DISTANCE ON MIGRATION

1. General Remarks

The modified gravity model, as mentioned in Chapter I, is a typical mathematical model used in empirical studies of migration. It is primarily intended as a prediction model, but is also used as a framework for testing behavioral hypotheses. The basic formulation of the model is $m = ax/y$, where m is volume of migration, x is a force of attraction, y is the distance between regions, or some other resistance factor, and a is a constant. The forces of attraction are usually income differentials and size of region, and the resistance is the distance between these regions.

All studies of the determinants of migration "prove" that distance has a strong negative effect on migration flows. On the basis of the results, most studies attribute the adverse effect of distance to either diminishing information about job opportunities or the increasing psychic costs due to increases in distance between two regions. However, there are serious faults with the models used to "explain" migration behavior. These faults make the models inadequate for explaining or predicting migration behavior.

The most disturbing fault of these models is the exclusion of variables which pertain to areas other than the origin (i) and destination (j). In these models, the assumption seems to be that migration flows

between one area and another are independent of all other migration flows between one of these areas as origin and all other possible destinations. The result is that the effects of variables related to areas other than origin and destination are ignored in the specification. The effect of the omitted variables may have important implications for policy.

Migration between any two areas is related to migration between any one of these regions regarded as an origin and all other possible destinations. The decision to migrate from i to j is made and acted upon after the potential migrants consider migrating to a selected number of alternative destinations. From an econometric point of view, the omission of variables which pertain to alternative destinations causes the models to be misspecified. If the omitted variables are correlated with the included variables, then the estimates of the coefficients may be "picking up" the effect of the omitted variables and consequently they will be biased.

In all studies, there is a failure to define clearly what the distance variable means. Distance enters the migration calculus when individuals contemplate migrating and they trade off possible income gains against pecuniary and psychic moving costs. There is no clear cut relationship of distance between origin and destination with migration flows taken in isolation. Rather, the relationship between migration and distance depends on an auxiliary relationship that expresses the accumulated alternative opportunities between the origin and destination

as a function of distance.[1]

In interpreting the role and meaning of the distance variable, distances other than the distance between origin (i) and destination (j) should be considered. Destination j will seem more or less attractive to potential migrants in origin i depending on the distances between i and other potential destinations. In other words, if a set of destinations are equally attractive in terms of possible benefits, their attractiveness to potential migrants from a given origin will be a function of their relative distances from i. Therefore, any equation which tries to "explain" migration behavior by using a distance variable must make allowance for the effect of relative distances.[2]

In most models, migration flows are pooled and a single regression is run for the pooled data. It is not clear that pooling provides reliable results for prediction purposes. Pooling the data on migration flows from different origins assumes a homogeneity of origins. However, in the studies which are examined in this chapter (migration behavior in Canada and the United States), the origins are not homogeneous. There are differences in age composition, industrial structure and geographical location. To a large extent, these factors can and do affect

---

[1]Stouffer introduces this concept: ". . . the number of people going a given distance from a point is not a function of distance directly but rather a function of the spatial distribution of opportunities." in "Intervening Opportunities and Competing Migrants," Journal of Regional Science, Volume II, No. 1, 1960.

[2]Schwartz treats distance in this manner: "The probability that a migrant (from k) chooses the lth location (rather than all other locations) decreases as the distance from k to l increases relative to the distances from k to all other locations . . ." Schwartz, "Distance and Migration," p. 1156.

migration behavior in different ways in individual origins. Furthermore, when the data are disaggregated and regressions are run for individual areas (states or cities), the results are vastly different from those obtained by using the pooled data. This would suggest that there must be a different model for each area (state or city), depending on its geographic location.

The following discussion of selected studies on migration is conducted in the light of the above remarks.

2. The Studies

(i) The Nelson Study[3]

Nelson emphasizes the scarcity of information as a dominant influence in explaining the effect of distance on migration. According to his argument, the prospective migrant moves to take advantage of an opportunity he knows about rather than to his best alternative opportunity. This "information hypothesis" predicts that "the greater the role of relatives and friends in distributing information, the greater the distance elasticity and the smaller the volume of migration."[4]

The results of the Nelson study are:

$$\log M = 1.958 \log I_a + 3.270 \log I_b - 1.71 \log D + .8307 \log Y_2 - .0372 U_2 + .0081 N_1 - 16.590.$$

where M represents migration rates obtained by dividing the gross migration flows between two states by the product of their populations; D is distance in railway miles between the origin and destination

---

[3]Phillip Nelson, "Migration, Real Income and Information," Journal of Regional Science, (Spring, 1959), pp. 43-73.

[4]Nelson, p. 57.

states; I_a and I_b are measures of industrial similarity in sending and receiving states; U_2 is the unemployment rate in the receiving state; Y_2 is income in the receiving state; N is the percent of U.S. natives residing in a state but born in another state.

The periods covered by the study are 1935-40 and 1949-50. N_1 is used in place of N_2 because the number of relationships between people in the sending and receiving states are equal.[5]

Nelson uses the "relatives and friends" variable N_1 as a proxy for information because "they have both an information and real income function."[6] However, the use of the relatives and friends multiplier as an explanatory variable is unsatisfactory. The extent to which migration serves to redistribute population from low income to high income areas depends crucially upon the efficiency of the flow of information about economic opportunities. The greater and more efficient the flow of information, the closer the pattern of migration will conform to that predicted by the purely economic model of the maximization of net benefits. With information scarce, the best alternative locations are seldom known and migration tends to be just to some alternative location where higher earnings are possible. In this case, the flow

---

[5]Nelson explains thusly: "There will be one difference between $R_{A \to B}$ and $R_{B \to A}$ (where $R_{A \to B}$ = the number of relations that people in A have in B). Suppose the major migration stream is from A to B rather than from B to A. Then A's relations in B will consist of more migrants than B's relations in A. Migrants would be more or less prone to distribute information to non-migrants . . . Our equation assumes that migrants and non-migrants distribute the same amount of job information. Some support to the approximate validity of this equation is given by a high cross-migration correlation . . ." Nelson, footnote 12, p. 50.

[6]Nelson, p. 49.

of information rather than differential earnings becomes the leading determinant of migration. The introduction of N_1 to explain migration flows introduces a high degree of multi-collinearity between the relatives and friends variable and the income variable. In terms of the model, N_1 which is a measure of past migration would have been a function of income differentials in the past. Regional income differentials in the past are correlated with those in the present and any measure of past migration is likely to be strongly correlated with differences in income in the period under consideration. We can conclude, therefore, that the "relatives and friends" variable is an effective predictor of migration, but should not be used to evaluate the role of information flows and their effect on the distance variable because it introduces multi-collinearity to such a degree that it makes it almost impossible to separate out the influences of separate variables on migration flows.

The industrial similarity variable, while it may determine the attractiveness of a particular area, in the sense of workers finding employment in occupations to which they are accustomed, ignores similarity between the region of origin and intervening regions. What it should try to explain is the probability that a migrant in an industry in region i will move to a similar industry in region j, given the distribution of industrial similarity in the intervening regions. Since the prospective migrant will explore the possibility of employment in those areas that are near to home, the use of this variable is unsatisfactory. The farther apart the receiving area is from the sending area, the higher the probability that there are several areas of similar industrial composition to the sending area between sending

and receiving areas.

What does the distance coefficient of -1.71 mean? Since the model is in log form, this means that the distance elasticity of migration is constant. It would mean that for a 10% increase in distance between sending and receiving states, migration between these two states will be reduced by 17%. This is hard to accept. The additional direct and indirect costs of travelling the additional distance cannot be sufficient to choke off 17 percent of migrants. Nelson argues that the greater the role of relatives and friends in distributing information, the greater the distance elasticity and the smaller the volume of the resulting migration.[7] He would also have to argue that the distance elasticity is lower than it would be with the relatives and friends variable and the industrial similarity variable left out of the regression.

This study relies too heavily on the relatives and friends multiplier to explain the effect of distance on migration rates:

> "Relatives and friends play a particularly crucial role in our analysis since they have both an information and a real income function . . . But the number of relations between people in A and B is an increasing function of previous migration from A to B and from B to A. Since the distribution of relatives and friends is a function of past migration, it is a function of all the variables which helped to determine past migration. . . . The calculated regression coefficients between migration and some variables will be multiplied through the operation of relatives and friends."[8]

and then:

---

[7]Nelson, p. 57.

[8]Ibid. p. 49.

"Relatives and friends provide a unifying principle for the variables determining migration. The money income hypothesis determines which variables will affect migration, but the relatives and friends multiplier determines the relative importance of these variables."[9]

More emphasis should have been placed on the industrial similarity variable, since the prospect of obtaining employment near to the home area will determine how far migrants will have to travel. Relatives and friends may be a good source of information at a distance. But, since migration can be considered as a predominantly economic activity, we would expect the industrial composition of potential destinations to play a more significant role than that performed by relatives and friends in an individual's decision to migrate to a certain destination because the industrial composition of an area determines the kinds of job opportunities which are available.

(ii) The Gallaway, Gilbert and Smith Study[10]

This study estimates the following equation for U.S. data (1955-60):

$$M_{ij} = a_o + b_o (Y_j - Y_i) + c_o D_{ij} + d_o (U_i - U_j) + U_o.$$

where Y_i and Y_j represent 1955 per capita income in the sending (i) and receiving (j) states; D_{ij}: distance in road miles between major cities in the origin and destination states; U_i and U_j: mean unemployment rates in states i and j (1955-59); M_{ij} represents gross migration flows from i to j "normalized" by deflating labor exports from each

---

[9]Nelson, p. 62.

[10]L. E. Gallaway, R. F. Gilbert and P. E. Smith, "The Economics of Labor Mobility: An Empirical Analysis." Western Economic Journal, (June, 1967), pp. 211-23.

state with an index constructed from data giving the number of workers in each state in 1955; U_0 is a random error term. They estimate regressions for each state, excluding Hawaii, Alaska and the District of Columbia. Another regression using net migration as the dependent variable is also estimated for each of the same states. In addition, a regression, using pooled data over all states, is also estimated.

The results for the pooled data are:

$$M_{ij} = \underset{}{550.6} + \underset{(.1507)}{.3481}\,(Y_j - Y_i) + \underset{(0.0474)}{2.3192}\,(U_i - U_j) - \underset{(-0.1646)}{22.3128}\,D_{ij}.$$ [11]

Gallaway et al do not have anything to say about the size of the coefficients. The Correlation coefficient for the pooled data is 0.279. This means that the regression with pooled data does not explain much of the total variance, and it also casts doubt on the reliability of estimates using pooled data.

On the basis of the partial correlation coefficients, unemployment differentials do not explain much of gross migration; unemployment differentials would seem to be of little use in a model of this kind since the available data on unemployment do not include hidden unemployment, nor account for geographical variations in frictional unemployment. In particular, regions that have high rates of growth may be expected to have fairly high rates of frictional unemploy-

---

[11] Since the function is linear, the distance elasticity of migration is different at different distances. The discussion will centre around the interpretation and size of the distance coefficient. Because it is not clear how the migration data were "normalized," reliable estimates of the distance elasticity of migration cannot be computed.

The figures in parentheses are the partial correlations.

ment.[12]

When the data are not pooled, the results show that (based on the partial correlation coefficients) distance "explains" a greater amount of gross migration than the differences in per capita income in a majority of the states. All distance coefficients are significantly different from zero ranging from -0.6309 for Maine to -296.7604 for Mississippi. Because it is not clear if the same units of measurement are used for each state, the only basis for comparison between states seems to be the partial correlation coefficients. Distance does not appear to be very important in the New England and mid Western states, while it assumes more importance in the Southern states. Some of the results, with the partial correlations in parentheses, are:

Maine: $$M_{ij} = 21.8 + \underset{(.380)}{.0215}\,(Y_j - Y_i) - \underset{(-.261)}{0.6309}\,D_{ij}$$

Minnesota: $$M_{ij} = 43.4 + \underset{(.277)}{0.0396}\,(Y_j - Y_i) - \underset{(-.072)}{0.9052}\,D_{ij}$$

Mississippi: $$M_{ij} = 2448.9 + \underset{(.318)}{3.5646}\,(Y_j - Y_i) - \underset{(.376)}{296.7604}\,D_{ij}$$

Georgia: $$M_{ij} = 1130.9 + \underset{(.174)}{0.8702}\,(Y_j - Y_i) - \underset{(-.227)}{72.3625}\,D_{ij}$$

There may be several explanations for the variations in the distance coefficients. In the first place, the states are not homogeneous. They vary in terms of educational composition of their respective labor forces, industrial structure, and degree of urbanization. These factors affect aggregate migration behavior. The distance coefficients

---

[12]Kenneth O. Alexander, "Employment Shifts in Areas of Persistent Unemployment," Industrial and Labor Relations Review, October 1968, pp. 73-84; Gene Laber, "Unemployment Classification of Major Labor Areas 1950-65: A Comment." Journal of Human Resources, Fall 1968, pp. 515-19; George Iden, "Unemployment Classification of Major Labor Areas: 1950-65." Journal of Human Resources, Summer 1967, pp. 375-91.

may be picking up the effects of these factors. For instance, the Southern states have had traditionally lower levels of education than the North-Eastern states. The Southern states are also less urbanized than the North-Eastern states. These factors, on their own, may cause an aversion to migration itself.

Assuming that the units of measurement are the same for all states, the extreme variation in the distance coefficients may be a reflection of the geographic location of the various states. The results should not necessarily be taken to mean that people from Mississippi are more averse to migrating long distances than are those migrants from Maine and Minnesota. The fact of the matter is that Maine and Minnesota are geographically "closer" to other states and consequently migrants will appear to be less averse to distance. On the other hand, migrants from Mississippi are "further" from the other states and will appear to be more averse to distance. Their destinations will most likely be nearer states.

Differences in labor force composition among the various states may also account for the extreme variation in the distance coefficients. The labor force in the North-Eastern states is more sophisticated in terms of educational achievement and skill composition. The labor market for the services offered by those living in these states will tend to be national rather than local. Many moves will tend to be long distance moves which may usually be associated with transfers. At the same time, migrants from these states may not have a strong preference for relatives and friends and consequently will

not be averse to moving long distances. On the other hand, the labor force in the Southern states is less sophisticated than that in the North-Eastern states. The demand for the services offered by workers in these states will tend to be local. In other words, migrants from the Southern states will most likely migrate to neighboring states in search of work. Psychic costs may be more important among these migrants than among migrants from the Norht-Eastern states.

Gallaway _et al_ state that "distance becomes the more important variable in the southern and western states."[13] In the case of the Western states, distance will appear to be "more important" because the major cities in every other state are far from the central cities of these states, sometimes as far as 2000 miles. There are enough attractive alternative destinations in the west to deter migrants from travelling 2000 miles. The high distance coefficients for the Western states are therefore not indicative of Westerners' attitude to distance.

Distance, in this study, "explains" a great amount of gross migration in a majority of the states.[14] This is based on the estimates of the partial correlation coefficients. However, the distance variable is a proxy for other variables which have been excluded from the model and which are a function of distance. Of particular importance is the variable expressing opportunities in alternative destinations which is a function of distance. The distance variable

---

[13]Gallaway _et al_, p. 217.

[14]Ibid.

may also be picking up the effects of the differences in educational composition, industrial structure, and degree of urbanization of the various states.

(iii) The Vanderkamp Study[15]

Vanderkamp, using a reduced form equation in a study of Canadian mobility (1947-66) finds similar distance elasticities, and it is interesting mostly because of the rather explicit policy conclusions he draws based largely on his interpretation of the distance co-efficients.

Vanderkamp distinguishes three types of migration flows: new migration; return migration and autonomous migration. Return migration "consists of those people who are returning to their home territory, which is some proportion of other migration flows in the opposite direction."[16] Autonomous migration "constitutes all those moves which are unrelated to average incomes in the regions, such as employment transfers within business firms, government agencies and the armed forces."[17]

Since return migration has the effect of linking gross migration flows in opposite directions, the reduced form equation is used to overcome the problem of simultaneity. The estimating equation is:

---

[15]John Vanderkamp, "Migration Flows, Their Determinants, and the Effect of Return Migration." Journal of Political Economy, September/ October 1971, pp. 1012-31.

[16]Ibid. p. 1014.

[17]Ibid.

$$M_{ij} = (a_0 + c_0)\ (1 + k) + (a_1 + ka_2)\ Y_j/D + (ka_1 + a_2)\ Y_i/D + a_3\ (1 + k)\ 1/D.$$

M_{ij} = gross migration flows from origin (i) to destination (j); Y_i and Y_j are annual earned income per person averaged over the period 1947 - 1966 for regions i and j respectively; D represents distance, measured in road miles between the main population centres of the regions; a_0, a_1, a_2, a_3, c_0 and k are shift parameters. M_{ij} is normalized by dividing the number of family allowance transfers between two regions by the sum of the family populations of the two regions in a particular year. To introduce the concept of the distance-income trade off, incomes are divided by distance since "the greater the distance, the more income prospects are discounted due to the uncertainty associated with distance."[18]

Vanderkamp estimates this reduced form equation for each of the twenty years examined, using regional dummy variables in some instances to improve the fit of the model. He then calculates the following equation in which the coefficients are averages over all the twenty years for the estimated parameters:

$$M_{ij} = .0454 + .2681\ Y_j/D + .1746\ Y_i/D - 1.27021/D.$$

Again the results show a negative relationship between distance and gross migration flows. Vanderkamp discovers that the overall level of migration is reduced under depressed economic conditions.

The distance variable does not only represent transport costs but, in fact, "represents four separate factors associated with mobility: (a) the money costs associated with moving; (b) the psychic

---

[18]Vanderkamp, p. 1015.

costs of moving; (c) the difference in psychic incomes associated with sender and receiver regions; and (d) uncertainty about income prospects due to lack of information."[19]

The implications of the results are derived from estimates of income-distance trade-offs for three "typical" cases: years with low unemployment (less than 4 percent); average years; and years with high unemployment (more than 4 percent). The trade-offs apply only to new migration. Vanderkamp discovers that "mobility responds much less to existing opportunities when there is a general slack in the labor market."[20] This may be so, but when there is a general slack in the labor market, workers are more likely to seek opportunities that they know about in neighboring regions, rather than look for opportunities which require long moves. In other words, when there is a general slack in the labor market, intervening opportunities play a more crucial role than when the economy is near full employment.

Even during "average" years, the trade-offs are high. At a 10 percent discount rate, the implied return per mile travelled during an average year is computed to be $4.62 at the margin. Vanderkamp argues that moving and settling costs and foregone earnings cannot account for the high income-distance trade-off. Instead "the other three elements of distance, namely, psychic costs of moving, ongoing preferences for nearby places, and uncertainty, must be quantitatively very important."[21] But during average years, workers will seek

---

[19]Vanderkamp, p. 1014.

[20]Ibid. p. 1025.

[21]Ibid. p. 1026.

employment in regions where they think they have a fair chance of obtaining employment. Potential migrants from the Atlantic Provinces for instance, will consider migration to Ontario more often than to the other provinces.

Vanderkamp suggests that the results also imply that "there is a very high potential rate of return to mobility policy.":

> "Such a policy may increase the rate of response to existing opportunities by reducing the uncertainty through information agencies, by making sources of financing available, and by reducing the psychic moving costs through aid with moving and settling problems, or it may in a general way, subsidize migration of eligible labor force members."[22]

The potential high rate of return presumably stems from the idea that there is relatively more under-investment in long distance moves than short distance moves on the part of the labor force. However, if as Vanderkamp suggests, such a policy could reduce uncertainty through information agencies, migrants might still not undertake long distance moves. If the adverse impact of distance is primarily due to diminishing information about distant locations, at the point where perfect spatial information is obtained (through the establishment of "information agencies") distance will still appear to influence the choice of destinations in a model such as that specified by Vanderkamp. With perfect information, potential migrants will know about all alternatives and the only consideration will be the relative costs of the moves. Migration will tend to be to a destination which is near to the home area.

---

[22]Vanderkamp, p. 1026.

In contrast to Vanderkamp's policy recommendations, Canadian Manpower Mobility Policy provides financial assistance for moves to the nearest areas where suitable employment is found. This suggests that the policy makers prefer more investment in short distance moves than in long distance moves.

(iv) The Schwartz Study[23]

The Nelson, Gallaway and Vanderkamp studies ignore all variables related to alternative destinations and "explain" migration between two areas as depending only on variables associated with the two areas. However, a study by Schwartz considers these alternatives. He discusses "the economic (and other) determinants of the adverse effect of distance on migration which is demonstrated by the negative distance elasticity of migration flows."[24]

Schwartz postulates that subjective predictions based on personal considerations play an important role in the decision to migrate and that the probability of a potential migrant moving from region i to region j increases as the distance from i to j decreases relative to a weighted average of distances to all other possible destinations. According to Schwartz, "subjective predictions are based on observed current earnings in alternative locations, current tightness of the market in terms of job openings and unemployment rates, personal connections, available information and personal cost of migration to

---

[23]Aba Schwartz, "Interpreting the Effect of Distance on Migration," Journal of Political Economy, September/October 1973, pp. 1153-69.

[24]Ibid. p. 1153.

alternative locations."[25] Subjective predictons differ among people, even if we limit ourselves to more homogeneous groups of persons by classifying them according to some attributes.

Schwartz's attention focuses on the probability of a person in origin k migrating to destination l, given that he is a migrant. Since he considers only those who move, the relevant variables are those associated with alternative destinations because the choice of a location is determined by its relative attractiveness over alternative destinations only.[26]

Schwartz holds a given destination constant and considers migration flows into that destination from selected origins. In this way, he tests the effect of distance on those "allocative shares" because (most) of the variation in migration flows into a destination is obtained by the variation of relative distance.[27] The problem with which he is concerned is "In what way do age and education affect the probability of choosing a certain destination over all others, given that the person has made his decision to move?"[28]

In order to arrive at the estimating equation, Schwartz expresses his argument in the form of maximum-likelihood functions of the probabilities of migration into each of the destinations:

---

[25]Schwartz, p. 1155.

[26]Ibid.

[27]Ibid. p. 1158.

[28]Ibid. p. 1159.

$$Y_{ijkl} = f\left(\frac{PV_{ijl}}{\sum_{n \neq k} w_n PV_{ijn}}, \frac{U_{ijl}}{\sum_{n \neq k} w_n U_{ijn}}, \frac{C_{ijl}}{\sum_{n \neq k} w_n C_{ijn}}, \frac{D_{kl}}{\sum_{n \neq k} w_n D_{kn}}, i, j\right), \quad (1)$$

$$Y_{ijkl} = \frac{M_{ijkl}}{\sum_{n \neq k} M_{ijkn}}$$

PV, U, C and D are present value of earnings, unemployment rate, cost of adjustment, and distance respectively. Subscripts: l represents destination area; k the area of origin; i the age group; j education group. M_{ijkl} is gross outflow of migrants in the ith age group, and jth education group moving from region k to region l. All independent variables are expressed as ratios of the magnitudes involved in l relative to a weighted average of the magnitudes in all destinations.[29]

He assumes that the above equation is Cobb-Douglas separable into two groups; one includes relative distance as the only variable; the other includes the remaining variables.[30]

$$Y_{ijkl} = f\left(\frac{PV_{ijl}}{\sum_{n \neq k} w_n PV_{ijn}}, \frac{U_{ijl}}{\sum_{n \neq k} w_n U_{ijn}}, \frac{C_{ijl}}{\sum_{n \neq k} w_n C_{ijn}}\right) \left(\frac{D_{kl}}{\sum_{n \neq k} w_n D_{kn}}\right)^{\eta_{ij}} \quad (2)$$

where η_{ij} is the distance elasticity of the ith age group and jth education group, which is assumed to be decomposed linearly into an age effect and an education effect.

$$\eta_{ij} = U + \alpha_i + \beta_j \quad (3)$$

where U is the elasticity of a reference age-education group, α_i is the differential contribution of age group i to the elasticity, and β_j is the differential contribution of education group j to the

---

[29]Schwartz, p. 1157.

[30]Ibid. p. 1162.

elasticity.

By substituting (3) in (2) and transforming to logarithms the equation becomes:

$$Y^*_{ijkl} = f^* \left(\frac{PV_{ijl}}{\sum_{n \neq k} w_n PV_{ijn}} ; \frac{U_{ijl}}{\sum_{n \neq k} w_n U_{ijn}} , \frac{C_{ijl}}{\sum_{n \neq k} w_n C_{ijn}} \right) + (U + \alpha_i + \beta_j) X^*_{kl} \quad (4)$$

where asterisks denote logarithms and X is the relative distance. By letting A be the value of f* for the reference group; and $_i$ be the ith age effect on log f and $_j$ be the jth education effect on log f both measured from the given reference group, equation (4) is transformed into its estimable form:

$$Y^*_{ijkl} = A + \gamma_i + \delta_j + (M + \alpha_i + \beta_j) X^*_{kl} + U_{ijkl} \quad (5)$$

where U_{ijkl} is the statistical disturbance.

Dummy variables for age and education are used to estimate U, $_i$, β_j, γ_i and δ_j. The regression equation which is estimated is:

$$Y^*_{ijkl} = A + \sum_{i=2}^{5} \gamma_i W_i + \sum_{i=2}^{5} \delta_j Z_j + \mu X^*_{kl} + \sum_{i=2}^{5} \alpha_i W_i X^*_{kl} + \sum_{i=2}^{5} \beta_j Z_j X^*_{kl} + U_{ijkl}.$$

W is the dummy variable for age; W_i = 2,...5 such that W_i = 1 if the age is i, and zero otherwise. Z is the dummy variable for education: Z = 2,...5 such that Z_j = 1, if the education level is j, and zero otherwise.

The age groupings (in years) are: 25-30, 30-34, 35-39, 40-54, 55-64.

The education groupings (in years of schooling) are: 0-4, 5-7, 8, 9-12, 13-16.

The empirical estimation is based on data on interdivisional flows of non-returnee white male migrants in the United States for the period

1955 to 1960. There are nine divisions and the population of each division is assumed to be concentrated in the major city of the division. Interdivisional distances are measured between these cities. The relative distance from k to l is computed as the ratio of the distance from k to l to a geometric mean of the distances from k to all destinations. Nine regressions are run, holding one division as a constant destination in each instance.

The results show that the relative distance elasticity is negative in all regressions. For the reference group (the youngest and least educated group ie. 25-30 years old with 0-4 years of schooling) the distance elasticity of migration is high: New England: -1.392; Middle Atlantic: -1.657; East North Central: -2.123; West North Central: -1.374; South Atlantic: -.963; East South Central: -1.546; West South Central: -2.169; Mountain: -1.979; Pacific: -1.546.

The results show that education strongly affects the distance elasticity of migration. This may be due to the increase in a person's capability of obtaining and analyzing published information as the level of education increases:

> "If the observed adverse impact of relative distance on the probability of migrating is primarily due to diminishing information, thus, as education increases, relative distance loses its deterrent impact and allocative shares become less sensitive to relative distance changes."[31]

The age effect on the distance elasticity is found to be weak, and it may support the hypothesis that the distance effect is really an

[31]Schwartz, p. 1162.

information effect.[32]

Of all the studies discussed, the Schwartz study is unique in that it is the only one which considers the influence of variables related to alternative destinations in explaining migration flows between two areas. Information, represented by the education variable, "explains" the effect of distance. However, if perfect spatial information exists, migrants (regardless of age) will still display an aversion to moving long distances.

Despite its attributes, this study only deals partially with the problem of migration as it relates to distance. Relative distance and the other variables associated with alternative destinations are entered as ratios. Since the influence of alternative destinations is expressed in the denominators of the "relative" variables, in the case of relative distance, the effect is that some regions may have the same relative distances as other regions even though the physical distances between origins and destinations may be different.[33]

The negative distance coefficient obtained in these studies cannot be explained solely in terms of increasing costs of information associated with increases in distance between two regions, or in terms

---

[32]Schwartz, p. 1167.

[33]This similarity of relative distances is apparent if we consider two destinations with weighted average distances of 400 and 800 miles respectively. If, in the first case, we have a set of four origins which are 200, 300, 500 and 800 miles respectively away from the destination. According to Schwartz, the relative distances are 200/400, 300/400, 500/400 and 800/400 miles respectively. On the other hand, if the other set of origins are 400, 600, 1000 and 1600 miles respectively away from the destination, the relative distances are 400/800, 600/800, 1000/800 and 1600/800 miles respectively. The ratios in both instances are the same, even though the raw distances in the second set of origins are greater than those in the first set of origins.

of increasing psychic costs associated with increases in distance. The relationship between migration flows and distance also depends on an auxiliary relationship which expresses the accumulated alternative opportunities between the origin and destination as a function of distance. Therefore, the larger the distance between destination and origin, the greater the number of alternative opportunities there are to discourage migrants from travelling long distances. This may well explain the magnitude of the negative distance coefficients.

The following chapter outlines an economic theory of migration and develops the concept of alternative opportunities and the influence on migration behavior. A prototype of the gravity model is then presented in the next chapter.

CHAPTER III

DISTANCE AND MIGRATION

Labor migration is the geographic form of labor mobility and may be defined as moves across labor market boundaries. Labor market areas are geographic markets for labor which are sufficiently isolated by distance from other labor markets so that wage and employment determination in each market is largely autonomous.[1]

Migration is considered to be a response to economic incentives and is viewed as being largely motivated by earnings maximization. People thus move to locations where they expect their net earnings to be highest. What is most relevant in evaluating economic motivations for migration may be the fact that many migrants, particularly better educated and informed individuals, migrate not so much for immediate gain in income as for the prospect of a more rewarding job opportunity in terms not only of salary but of promotion, challenging tasks, pleasant working conditions, etc. over an extended period of time. However, the basic economic (and social) motivations to migration do

---

[1]Warren Mazek, The Efficacy of Labor Migration with Special Emphasis on Depressed Areas, (University Microfilms Inc., Ann Arbor, Michigan 1966), pp. 32-33.

This definition of migration provides no problems for the empirical work which follows. The boundaries of labor market areas, as delineated by the U.S. Department of Labor, coincide with those of Standard Metropolitan Statistical Areas which are the units of analysis in the study.

not apply equally to all individuals. We would expect migration differentials by occupation, income, age, sex and race subgroupings of the population. This is one explanation why not all move if one moves and why all migrants do not move in the same direction.

The number of people going a given distance from a point is a function of the spatial distribution of opportunities. If we think of migration as an investment in human capital, then the migrant will move to maximize the net present value of his investment. The crucial determinant of migration is therefore the expected gain to be achieved, where the expectation is held with a greater or lesser degree of uncertainty. The decision to migrate is thus purely subjective on the part of the individual since individual migrants form their own subjective predictions regarding future income streams in the home area and in alternative destinations. These subjective predictions are based on observed current earnings in alternative locations, current tightness of the labor market in terms of job openings and unemployment rates; friends and relatives in the areas of destination,[2] and personal money cost of migration to the alternative destinations.

The consensus among demographers is that distance constitutes a barrier to mobility. Various reasons have been advanced to explain the effect of distance on migration. The most frequently used explanations are the high information and psychic costs which are associated with moving long distances. However, if the observed impact of distance

---

[2]The presence of relatives and friends in destination areas serves as a source of information as well as psychic benefits.

on migration flows is primarily due to increasing information costs associated with increases in distance, at the point where perfect spatial information is obtained, distance will still influence the choice of destinations. Migrants will only travel as far as is necessary. Whether or not there is perfect spatial information, the number of migrants travelling a certain distance from a point is a function of the spatial distribution of opportunities. Therefore, as the distance between two points (origin and destination) increases, the number of intervening opportunities increases and the higher the probability that distance appears to deter migration.

The decision to migrate is made and acted upon after the potential migrant considers migrating to a selected number of alternative destinations. Factors which migrants consider include: relative concentrations of opportunities for occupational, educational and social mobility; relative concentrations of desirable environmental amenities; and relative concentrations of the young and well-educated. The larger the distance between the origin (i) and destination (j) the higher the probability that there are alternatives to j that are at least as attractive and also closer to i than j. Migrants will not undertake unnecessarily long and expensive moves when they can make short, less expensive moves which are as profitable or even more profitable.

In considering alternative destinations, migrants take into account the income-distance trade-off. If the distance between two regions is large, the net costs of transportation and income loss during relocation are important factors. When individuals evaluate various regional employment possibilities, they discount the anticipated

income by whatever amount is necessary to compensate for the costs associated with moving. This discounted income can be thought of as a "shadow" income and the choices that individuals face can be described as consisting of comparing alternative "shadow" incomes and selecting the one that is highest. The higher the expected income and the lower the costs of employment in and movement into a region, ceteris paribus, the higher the shadow income that migrants perceive in the region. This suggests that migrants' response to differential income levels in the two regions will lead to flows from the lower to the higher income region. The greater the distance between two regions, the lower the shadow income, and the higher the shadow income in other closer alternatives, and consequently the less attractive the distant region becomes to potential migrants.

So much for the conceptualization of the relationship between distance and inter-regional migration flows. In the following chapter, this relationship is illustrated empirically.

CHAPTER IV

AN EMPIRICAL TEST OF THE INFLUENCE OF DISTANCE ON GROSS MIGRATION FLOWS

This chapter presents a prototype of the commonly used gravity model of migration. The aim is to point out that the distance coefficients obtained in regression analyses of migration flows should not necessarily be interpreted as indicating that distance, in itself, furnishes a strong deterrent to migration. There is no necessary relationship between mobility and distance per se. Rather, the relationship between mobility and distance depends on an auxiliary relationship that expresses the intervening (or alternative) opportunities between the origin and destination as a function of distance.

As pointed out in Chapter III, the decision to migrate is made and acted upon after the potential migrants assess the benefits to be gained by migrating to a set of alternative destinations. While there is no way of saying how many alternatives are considered, what can be said with certainty is that when independent, unsponsored moves are undertaken, more than one destination will be considered. The migration models to date, with the exception of the Stouffer model of "intervening opportunities" seem to assume that migration between two areas is independent of migration between one of these areas and all other possible destinations. By considering only variables related to origin and destination areas, and ignoring variables which pertain to alternative destinations, these models are mis-specified since the

omitted variables are obviously correlated with those which are included, in particular with the distance variable.

The Variables

Migration flows into and out of thirty-six large (SMSAs) Standard Metropolitan Statistical Areas (populations over 250,000) in the United States (between 1955 and 1960) are analyzed. There are 1260 separate migration streams. Migration data are from the 1960 United States Census[1] which gives the number of persons who have moved into and out of large SMSAs between 1955 and 1960. A five-year period is a fairly good span for a study of this nature. It provides substantial data and avoids unusual types of migration that might occur in an unusual single year. One problem in using a five-year period however, is the omission of intervening migration. Return migration and multiple moves during the five-year period are not accounted for.

The dependent variable is gross migration from the ith SMSA to the jth SMSA.

i) Populations in both sending and receiving have been introduced in several ways in regression equations of migration behavior. Population is considered a pull factor in its influence on migration flows. If flows out of a given SMSA are being analyzed, the relevant population variable is population in the receiving SMSA. If flows into a given SMSA are analyzed, the population in the sending SMSA is the relevant population variable.

---

[1]U.S. Bureau of the Census, U.S. Census of Population: 1960 Subject Reports, Mobility for Metropolitan Areas, Final Report PC (2) 2C, (Washington, D. C. Government Printing Office, 1963) Table 3.

(ii) The economic theory of migration predicts that migration occurs when individuals find that, through geographical movement, they are likely to increase their earnings by an amount sufficient to make them willing to incur the costs of moving. Most studies use income differentials to represent the income variable. Median family incomes in 1959 in the respective SMSAs are used here to represent the income variable. When flows out of a given SMSA are examined, the relevant income data are median incomes in receiving SMSAs. Median incomes in the sending SMSAs are used when flows into a given SMSA are analyzed. The relationship between income variables and migration flows is not clear cut. We may expect that incomes in the receiving SMSAs are positively related to migration flows since they are considered as pull factors for potential migrants. On the other hand, there may be a positive or negative relationship between incomes in sending SMSAs and migration flows. A positive relationship can be expected if we consider that high incomes in the sending SMSAs mean that potential migrants can more afford to finance migration, while the negative relationship results if we believe that migrants are reluctant to leave areas with high median incomes.

(iii) Distance is usually intended as a proxy for travelling costs and is often interpreted as representing information and psychic costs as well. While it is a simple, clear and relatively easy to measure concept, the interpretation of its role, as usually entered into these models is anything but clear cut. In fact, the purpose of this paper is to establish just that. The measure of distance used here is the highway mileage between the central cities of the two relevant SMSAs.

The relationship to be tested is assumed to be multiplicative and becomes linear under log transformation. It takes the form:

$$M_{ij} = A \; P_i^{\delta} \; P_j^{\varepsilon} \; Y_i^{\alpha} \; Y_j^{\beta} \; D_{ij}^{\gamma} \, u$$

where M_{ij}: gross migration flows from origin SMSA (i) to destination SMSA (j).

P_i, P_j: population (five years and older) in the origin and destination SMSA respectively.

Y_i, Y_j: median income in the origin and destination SMSA respectively.

D_{ij}: highway distance between central cities of the origin and destination SMSAs.

A: constant term.

α, β, δ, ε and γ are shift parameters.

Under log transformation, the equation becomes:

$$\log M_{ij} = \log A + \delta \log P_i + \varepsilon \log P_j + \alpha \log Y_i + \beta \log Y_j + \gamma \log D_{ij} + u.$$

where u is the error term.

Because of the assumed relationship between migration flows and the explanatory variables, we should consider the expected signs of the various coefficients. The sign of the coefficients for the population variables are expected to be positive since population is a pull factor. Incomes in destination SMSAs are positively related to migration flows. Consequently, the sign of the coefficient is expected to be positive. The sign of the income coefficient in origin SMSAs is either negative or positive because of the uncertain influence that incomes in sending areas have on migration flows. Since distance is considered a deterrent to migration flows, the distance coefficient is expected to have a negative sign.

The procedure used in analysing migration flows among these SMSAs, using this model, is as follows:

(i) A separate regression is run for each of the 36 SMSAs using data on migration flows into each SMSA.

(ii) Another separate regression is run for each of the 36 SMSAs using data on migration flows out of each SMSA.

(iii) A regression using pooled data (migration flows into and out of a given SMSA) is run for each of the 36 SMSAs.

The Results

The results are presented in Tables I, II and III.

In almost all instances, the population variables have the expected signs. Most values are close to unity. Population in the destination SMSA seems to have a greater influence than population in origin SMSA on migration flows when the data are pooled (Table III). However, this distinction is not very significant.

Incomes in destination SMSAs do not behave as expected. This may suggest that incomes in destination areas are not as important as theory tells us or are poorly measured. On the other hand, it is possible that society was affluent enough so that people were more likely to migrate in search of amenable conditions and to disregard costs. With a choice of job opportunities, a more affluent population can choose new locations on the basis of factors other than income.

Distance seems to explain a greater amount of gross migration than median incomes do. However, the negative distance coefficients do not prove that distance is a deterrent to migration. When we

examine migration flows out of SMSAs (Table I), the distance elasticities of migration range from -.01 for Milwaukee to -2.035 for Portland. When migration flows into SMSAs are examined (Table II), the elasticities range from -.388 for Pittsburgh to -1.814 for Portland. The pooled data (Table III) reveal distance elasticities ranging from -.282 for Chicago to -2.035 for Portland. What can we conclude from these results? Does it mean that migrants from Milwaukee are not averse to distance while migrants from Portland are so averse to travelling long distances that if distance increases by 10 per cent, twenty per cent of migrants will refuse to make the move? This appears implausible. The striking variation in the estimates of the distance elasticities for the different SMSAs suggests that different structures apply to the different geographical areas. For instance, the estimated distance elasticities for Denver, Phoenix, Los Angeles, San Francisco, Seattle and Portland are all very high when we consider migration flows out of these SMSAs. These SMSAs have one thing in common: they are all located in the Western part of the country. They are also furthest from the other SMSAs in the sample. Since they are relatively further than the other SMSAs, migration from these SMSAs would tend to be to those destinations which are close. A case may be made for this kind of behavior on the grounds of diminishing information with increases in distance. However, if there were perfect spatial information, distance would still appear to impede migration.

When we analyse migration flows into the SMSAs (Table II), the distance elasticity in each case, except for those Western SMSAs is

higher than when migration flows out of the SMSAs are considered. In the case of the Western SMSAs, the distance elasticities are lower. Does this mean that migrants to these SMSAs are less averse to travelling long distances than migrants from these SMSAs? One possible explanation for this may be non-economic. It may be due to climatic factors. It has been proved that climatic conditions play an important role in determining the attractiveness of destinations.[2]

The same observations can be made about the Western SMSAs from an examination of Table III where results of the pooled data are presented. In each instance, the estimated values of the distance coefficients is the average of the values of the coefficients obtained in Tables I and II.

One thing is clear from these results. There appear to be substantial differences in the sensitivity of migrants in various SMSAs to the distance variable and there appears to be a systematic pattern to this differential sensitivity. Distance tends to be important among migrants from Western SMSAs. It may be true that in this case, distance is serving as a proxy for other considerations. For example, it could be indicative of strong subjective preferences on the part of migrants from the Western SMSAs or it could be an indication of an asymmetry in the flow of labor market information between areas.

But spatial distribution of economic opportunities are probably

---

[2]See Herbert Karp and Dennis Kelly, Toward an Ecological Analysis of Inter Metropolitan Migration. (Chicago, Markham Publishing Company, 1971), p. 31.

most important in accounting for these differences in sensitivity to distance among migrants from the various SMSAs. The size of the coefficients may be due to a specification error due to the omission of a variable representing the alternative economic opportunities between origin and destination SMSAs. There is a correlation between distance and the spatial distribution of economic opportunities and thus the estimated distance coefficients are biased upwards since the distance variable "captures" the effect of alternative opportunities. If an index of the spatial distribution of opportunities is included in the model, the estimates of the distance coefficients would be lower. On the other hand, if the spatial distribution of opportunities is held constant and distance is varied, the distance elasticity of migration for both origin and destination SMSAs would not be as high as the results show.

CHAPTER V

CONCLUSION AND SUMMARY

Migration results from the interaction of economic, social and psychological factors, and so it is difficult to expect a simple model which includes three or four variables to explain gross migration flows adequately. At best, we can only speculate on the impact on gross migration flows of factors such as information costs and intervening opportunities for which the distance variable is obviously a proxy. Until the differential impact of these factors can be clearly assessed, any attempt to make policy recommendations is of limited value. The wide variation in the estimates of the distance elasticity of migration into and out of the various SMSAs suggest that a different model is needed for each SMSA. This is not a satisfying situation especially since the model omits other variables which may be quantitatively important in explaining the effect of distance on gross migration flows among SMSAs.

The variation in the distance elasticities does not disappear when pooled data are used instead of separate data on migration to and from each SMSA. If the data had been pooled, instead of running separate regressions on migration to and from each SMSA, the results suggest that SMSA effects for each SMSA, if included, would substantially improve the fit of such an overall grand regression.

The explanation that high information costs are responsible for

the deterrent effect of distance on gross migration flows needs reconsideration. The argument is that information is scarce and expensive at a distance and consequently migrants are averse to making long distance moves. However, if there is perfect spatial distribution of information, migrants may still prefer short distance moves to long distance moves if economic opportunities are distributed rather homogeneously simply because increasing moving costs could make long distance moves unattractive under such circumstances, i.e. intervening opportunities could "choke off" long distance moves. Therefore, while the availability of cheap information would reduce the risks associated with long distance moves, it will not necessarily stimulate long distance moves.

The decision to migrate to a certain destination is the result of subjective predictions of the costs and benefits of the move. Migrants tend to move to those destinations where their predictions of net benefits are highest. This is why all moves out of a given location are not in the same direction. An important determinant in the selection of one destination rather than another is the spatial distribution of economic opportunities. As the distance between an origin and destination increases, the number of alternative opportunities also increases. Migrants will choose from among the "good" alternatives the destinations which they consider the best. The best may also be the closest. If this is so on average, then most moves will tend to be short distance moves, and there would be no need for policy to correct under-investment in long distance migration.

The basic model of migration includes only those variables associated with the origin and destination areas and excludes those variables associated with alternative destinations, which do have an effect on migration flows and are also correlated with the included variables. If the model is to be used for prediction and as a basis for policy, it should include those variables which influence migration behavior and are associated with alternative destinations.

This analysis points out the short comings of using the gravity model to explain migration flows. In particular, it stresses the short comings of using mere physical distance as an explanatory variable. The objections raised concerning the gravity model should stimulate theoretical and empirical analyses which will lead to refinements in the theory of migration.

The concept of alternative opportunities needs to be developed further and incorporated into the theory of migration. A model which includes some measure of alternative opportunities would prove to be more useful for students of demography as well as manpower policy makers.

TABLE I

REGRESSION RESULTS FOR GROSS MIGRATION FLOWS OUT OF SELECTED SMSAs (POPULATION: 250,000 AND OVER)

NOTE: The figures in parentheses are the standard errors.

SMSA	CONSTANT	LOG P_j	LOG Y_j	LOG D_{ij}	R^2
Albany	10.066 (10.65)	1.103 (.299)	-2.008 (1.284)	-0.381 (.195)	.5016
Atlanta	30.529 (7.75)	1.180 (.173)	-4.259 (1.011)	-.682 (.266)	.6486
Baltimore	8.285 (7.360)	1.099 (.159)	-1.910 (.899)	-.145 (.141)	.6221
Birmingham	18.230 (8.71)	1.221 (.191)	-2.765 (1.130)	-.905 (.233)	.6248
Boston	13.854 (8.828)	1.270 (.192)	-2.592 (1.095)	-.391 (.136)	.6130
Buffalo	9.114 (11.334)	1.060 (.226)	-1.757 (1.379)	-.409 (.197)	.4493
Chicago	4.958 (9.75)	.966 (.208)	-1.204 (1.187)	-.025 (.191)	.4308
Cincinnati	11.425 (9.457)	.838 (.204)	-1.562 (1.182)	-.532 (.158)	.4272
Cleveland	-.477 (9.515)	.822 (.207)	-.253 (1.190)	-.313 (.166)	.4129
Columbus	7.182 (9.767)	.797 (.204)	-1.144 (1.207)	-.383 (.159)	.3897
Dallas	14.830 (9.507)	1.143 (.210)	-1.722 (1.265)	-1.466 (.318)	.5951
Dayton	4.981 (10.835)	.845 (.235)	-.986 (1.366)	-.376 (.172)	.3497
Denver	15.14 (8.9)	1.126 (.182)	-1.163 (1.028)	-2.067 (.438)	.6342

TABLE I (continued . . .)

SMSA	CONSTANT	LOG P_j	LOG Y_j	LOG D_{ij}	R^2
Detroit	6.339 (9.700)	.903 (.199)	-1.221 (1.189)	-.167 (.171)	.4096
Houston	18.85 (9.54)	1.187 (.199)	-2.32 (1.296)	-1.373 (.308)	.6438
Indianapolis	2.892 (10.637)	.810 (.229)	-.747 (1.326)	-.298 (.190)	.3265
Kansas City	8.254 (10.598)	1.172 (.234)	-1.663 (1.305)	-.621 (.343)	.4564
Los Angeles	10.140 (4.403)	1.024 (.103)	-.471 (.545)	-1.698 (.143)	.8744
Louisville	.526 (2.4)	.602 (.165)	-.0001 (.011)	-.473 (.163)	.3767
Memphis	15.099 (8.97)	1.134 (.192)	-2.35 (1.133)	-.7495 (.242)	.5500
Miami	12.100 (5.452)	1.176 (.112)	-2.049 (.755)	-.650 (.199)	.7928
Milwaukee	1.606 (13.142)	.718 (.235)	-.667 (1.625)	0.01 (.262)	.2698
New Orleans	19.762 (9.637)	1.245 (.201)	-3.144 (1.292)	-.663 (.319)	.5676
New York	5.584 (12.873)	.131 (.081)	.317 (1.451)	-.302 (.225)	.1181
Philadelphia	16.415 (7.095)	1.219 (.159)	-2.887 (.872)	-.251 (.125)	.6741
Phoenix	17.216 (7.509)	.723 (.155)	-.804 (.972)	-2.028 (.284)	.7392
Pittsburgh	.682 (11.387)	.549 (.157)	-.030 (1.313)	-.191 (.206)	.3198
Portland	25.401 (10.750)	1.018 (.217)	-2.021 (1.303)	-2.256 (.287)	.7283
Providence	12.167 (9.423)	1.249 (.208)	-2.660 (1.179)	-.234 (.165)	.5943

TABLE I (continued . . .)

SMSA	CONSTANT	LOG P_j	LOG Y_j	LOG D_{ij}	R^2
Rochester	1.597 (12.900)	1.140 (.269)	-1.265 (1.586)	-.213 (.221)	.3983
St. Louis	10.978 (9.096)	.964 (.204)	-1.875 (1.130)	-.219 (.230)	.4145
San Antonio	3.494 (8.982)	.859 (.164)	-.398 (1.178)	-.878 (.266)	.6011
San Francisco - Oakland	22.910 (4.962)	1.086 (.106)	-2.106 (.594)	-1.738 (.157)	.8804
Seattle	14.641 (7.379)	1.145 (.152)	-1.289 (.880)	-1.818 (.210)	.8111
Tampa	7.841 (7.042)	.878 (.135)	-1.205 (.944)	-.566 (.216)	.6004
Toledo	9.762 (13.036)	.794 (.231)	-1.349 (1.540)	-.630 (.212)	.4056

TABLE II

REGRESSION RESULTS FOR THE GROSS MIGRATION FLOWS INTO SELECTED SMSAs (POPULATION: 250,000 AND OVER)

NOTE: The figures in parentheses are the standard errors.

SMSA	CONSTANT	LOG P_i	LOG Y_i	LOG D_{ij}	R^2
Albany	7.431 (7.959)	1.045 (.171)	-1.306 (.960)	-.869 (.146)	.7516
Atlanta	21.135 (4.355)	1.006 (.097)	-2.715 (.568)	-.859 (.124)	.8229
Baltimore	6.265 (3.87)	1.018 (.084)	-1.28 (.473)	-.515 (.074)	.8821
Birmingham	13.556 (7.154)	1.071 (.157)	-1.768 (.929)	-1.245 (.191)	.7215
Boston	.559 (4.412)	1.069 (.096)	-.581 (.547)	-.574 (.068)	.8704
Buffalo	11.699 (7.463)	.945 (.149)	-1.644 (.908)	-.771 (.129)	.7029
Chicago	6.916 (4.527)	.988 (.097)	-1.101 (.551)	-.538 (.091)	.8041
Cincinnati	5.672 (5.626)	.853 (.122)	-.731 (.703)	-.835 (.094)	.7920
Cleveland	-7.043 (5.996)	.660 (.130)	1.001 (.750)	-.654 (.104)	.7236
Columbus	-1.385 (6.935)	.772 (.145)	.185 (.857)	-.796 (.113)	.7451
Dallas	7.058 (4.970)	1.024 (.110)	-.482 (.661)	-1.584 (.166)	.8329
Dayton	9.839 (6.131)	.818 (.133)	-1.255 (.773)	-.730 (.097)	.7303
Denver	.353 (5.485)	1.017 (.112)	.446 (.630)	-1.651 (.270)	.8072

TABLE II (continued . . .)

SMSA	CONSTANT	LOG P_i	LOG Y_i	LOG D_{ij}	R^2
Detroit	7.096 (5.066)	.902 (.104)	-1.02 (.621)	-.629 (.089)	.7890
Houston	10.92 (5.15)	1.035 (.107)	-.995 (.699)	-1.523 (.166)	.8459
Indianapolis	6.508 (6.524)	.947 (.140)	-1.095 (.813)	-.744 (.117)	.7212
Kansas City	7.517 (7.617)	1.028 (.168)	-1.034 (.938)	-1.050 (.246)	.6117
Los Angeles	7.229 (3.94)	.957 (.092)	.989 (.488)	-.765 (.128)	.8438
Louisville	.141 (2.311)	.727 (.157)	.010 (.010)	-.777 (.155)	.5782
Memphis	13.25 (6.39)	1.091 (.137)	-2.012 (.807)	-.858 (.173)	.7040
Miami	-6.857 (5.957)	1.177 (.122)	.850 (.825)	-1.369 (.218)	.8110
Milwaukee	4.773 (7.581)	.916 (.135)	-.904 (.937)	-.599 (.151)	.7113
New Orleans	20.423 (6.229)	1.108 (.130)	-2.799 (.835)	-.912 (.206)	.7426
New York	-.885 (9.034)	.137 (.057)	1.154 (1.019)	-.477 (.158)	.3380
Philadelphia	5.767 (4.246)	1.070 (.095)	-1.139 (.523)	-.600 (.075)	.8773
Phoenix	-18.058 (6.186)	.524 (.128)	2.851 (.801)	-.914 (.234)	.7275
Pittsburgh	-8.688 (8.102)	.465 (.112)	1.283 (.935)	-.388 (.147)	.5460
Portland	5.936 (7.491)	.871 (.151)	.108 (.908)	-1.814 (.200)	.8136
Providence	17.390 (9.138)	1.011 (.202)	-2.586 (1.144)	-.641 (.160)	.6388

TABLE II (continued . . .)

SMSA	CONSTANT	LOG P_i	LOG Y_i	LOG D_{ij}	R^2
Rochester	-.086 (8.634)	.976 (.180)	-.395 (1.062)	-.764 (.148)	.6899
St. Louis	2.921 (5.771)	.902 (.129)	-.551 (.717)	-.657 (.146)	.6706
San Antonio	-1.029 (5.144)	.800 (.094)	.045 (.675)	-.627 (.152)	.7805
San Francisco - Oakland	6.935 (4.375	1.000 (.093)	-.399 (.524)	-1.310 (.139)	.8796
Seattle	13.979 (9.735)	1.208 (.200)	-1.542 (1.161)	-1.513 (.277)	.6809
Tampa	-28.502 (6.538)	.880 (.126)	4.010 (.877)	-1.568 (.201)	.8009
Toledo	2.965 (8.134)	.575 (.144)	-.075 (.961)	-.853 (.132)	.6925

TABLE III

REGRESSION RESULTS FOR POOLED DATA[1] ON GROSS MIGRATION FLOWS FOR SELECTED SMSAs (POPULATION: 250,000 AND OVER)

NOTE: The figures in parentheses are the standard errors.

SMSA	CONSTANT	LOG P_i	LOG P_j	LOG Y_i	LOG Y_j	LOG D_{ij}	R^2
Albany	8.53	0.811	1.337	-.555	-2.759	-.625	.5947
	(14.018)	(.190)	(.190)	(1.200)	(1.200)	(.131)	
Atlanta	40.34	1.004	1.182	-2.602	-4.371	-.771	.7124
	(8.97)	(.139)	(.139)	(.769)	(.769)	(.126)	
Baltimore	5.765	1.097	1.020	-1.184	-2.007	-.330	.7165
	(.521)	(.127)	(.127)	(.744)	(.744)	(.083)	
Birmingham	19.621	1.290	1.002	-2.668	-1.866	-1.075	.6663
	(11.526)	(.173)	(.173)	(.938)	(.938)	(.153)	
Boston	3.612	1.123	1.216	-.449	-2.724	-.482	.7145
	(.977)	(.136)	(.136)	(.859)	(.859)	(.076)	
Buffalo	11.002	.869	1.136	-.504	-2.897	-.590	.5477
	(13.547)	(.191)	(.191)	(1.504)	(1.504)	(.120)	

[1]Gross migration flows into and out of a given SMSA, and a regression is run for this "pooled" data.

TABLE III (continued . . .)

SMSA	CONSTANT	LOG P_i	LOG P_j	LOG Y_i	LOG Y_j	LOG D_{ij}	R^2
Chicago	.721 (10.80)	.943 (.138)	1.011 (.138)	-.379 (.899)	-1.926 (.899)	-.282 (.111)	.5409
Cincinnati	6.666 (11.075)	.734 (.164)	.957 (.164)	.023 (.938)	-2.315 (.938)	-.683 (.094)	.5876
Cleveland	-17.697 (11.350)	.661 (.175)	.821 (.175)	1.325 (.875)	-.576 (.875)	-.484 (.099)	.5418
Columbus	-3.532 (11.955)	.702 (.155)	.868 (.155)	-1.787 (1.000)	.828 (1.000)	-.590 (.100)	.5572
Dallas	5.286 (11.233)	1.048 (.170)	1.120 (.170)	-.308 (.985)	-1.895 (.985)	-1.525 (.182)	.6769
Dayton	5.966 (12.471)	.790 (.165)	.873 (.165)	-.983 (.938)	-1.257 (.938)	-.553 (.100)	.4911
Denver	-3.9 (10.32)	1.188 (.149)	.956 (.149)	-.277 (.861)	-.440 (.861)	-1.859 (.271)	.6767
Detroit	2.815 (11.206	.923 (.147)	.882 (.147)	.009 (.921)	-2.250 (.921)	-.398 (.101)	.5542
Houston	13.51 (11.46)	1.045 (.160)	1.178 (.160)	-1.245 (.979)	-2.071 (.979)	-1.448 (.176)	.7154
Indianapolis	.846 (12.547)	.810 (.165)	.946 (.165)	-.218 (.984)	-1.625 (.984)	-.521 (.114)	.4891

TABLE III (continued . . .)

SMSA	CONSTANT	LOG P_i	LOG P_j	LOG Y_i	LOG Y_j	LOG D_{ij}	R^2
Kansas City	5.253 (12.738)	.949 (.193)	1.250 (.193)	-.655 (1.085)	-2.042 (1.085)	-.835 (.211)	.5153
Log Angeles	-16.37 (8.01)	.632 (.107)	1.350 (.107)	1.082 (.711)	-.564 (.711)	-1.232 (.132)	.8106
Louisville	-8.670 (3.28)	.541 (.152)	.788 (.152)	.013 (.011)	-.004 (.011)	-.625 (.117)	.4689
Memphis	17.36 (10.76)	1.081 (.164)	1.145 (.164)	-2.554 (.785)	-1.804 (.785)	-.804 (.148)	.6211
Miami	-8.543 (8.809)	1.159 (.123)	1.194 (.123)	.898 (.655)	-2.097 (.655)	-1.009 (.156)	.8002
Milwaukee	-1.383 (15.093)	.896 (.183)	.783 (.183)	-.384 (.073)	-1.187 (.073)	-.295 (.153)	.4392
New Orleans	28.865 (11.644)	1.098 (.167)	1.255 (.167)	-2.908 (.863)	-3.035 (.863)	-.787 (.188)	.6374
New York	-6.155 (15.477)	.169 (.060)	.099 (.060)	1.476 (1.215)	-.004 (1.215)	-.389 (.137)	.2173
Philadelphia	10.936 (8.386)	1.127 (.108)	1.162 (.108)	-1.018 (.729)	-3.008 (.729)	-.426 (.075)	.7527
Phoenix	-17.491 (13.968)	.861 (.195)	.386 (.195)	3.258 (1.301)	-1.212 (1.301)	-1.471 (.269)	.5989

TABLE III (continued . . .)

SMSA	CONSTANT	LOG P_i	LOG P_j	LOG Y_i	LOG Y_j	LOG D_{ij}	R^2
Pittsburgh	-16.834 (14.066)	.595 (.128)	.419 (.128)	1.429 (1.144)	-.177 (1.144)	-.290 (.130)	.4043
Portland	11.022 (12.607)	.942 (.167)	.946 (.167)	-.352 (1.062)	-1.561 (1.062)	-2.035 (.175)	.7563
Providence	21.701 (13.102)	1.017 (.197)	1.243 (.197)	-2.606 (1.172)	-2.639 (1.172)	-.438 (.117)	.5970
Rochester	-6.054 (15.649)	1.033 (.196)	1.082 (.196)	-.208 (1.135)	-1.453 (1.135)	-.488 (.135)	.5032
St. Louis	3.804 (10.96)	.970 (.164)	.896 (.164)	-.306 (.972)	-2.119 (.972)	-.438 (.141)	.4928
San Antonio	-8.464 (10.224)	.783 (.131)	.876 (.131)	.231 (.726)	-.583 (.726)	-.752 (.152)	.6685
San Francisco - Oakland	10.273 (7.786)	.768 (.109)	1.319 (.109)	-.753 (.676)	-1.752 (.676)	-1.524 (.127)	.8343
Seattle	10.193 (11.871)	1.285 (.171)	1.069 (.171)	-2.300 (.912)	-.531 (.912)	-1.666 (.175)	.7395
Tampa	-33.734 (10.406)	.868 (.138)	.889 (.138)	3.18 (.726)	-.379 (.726)	-1.067 (.158)	.7800
Toledo	3.606 (14.944)	.568 (.158)	.800 (.158)	.238 (1.126)	-1.662 (1.126)	-.741 (.124)	.5344

BIBLIOGRAPHY

ARTICLES

Alexander, Kenneth. "Employment Shifts in Areas of Persistent Unemployment." Industrial and Labor Relations Review, October 1968, 73-84.

Blanco, Cicely. "The Determinants of Inter-state Population Movements." Journal of Regional Science, Summer 1963, 77-84.

Bodenhofer, Hans-Joachim. "The Mobility of Labor and the Theory of Human Capital." Journal of Human Resources, Fall 1967, 431-48.

Bright, Margaret J. and Thomas, D. S. "Inter-state Migration and Intervening Opportunities." American Sociological Review, December 1941, 773-85.

Courchene, Thomas J. "Interprovincial Migration and Economic Adjustment." Canadian Journal of Economics, November 1970, 550-76.

Gallaway, Lowell E. "Labor Mobility, Resource Allocation and Structural Unemployment." American Economic Review, September 1963, 694-716.

Gallaway, Lowell E. "Industry Variations in Geographic Mobility Patterns." Journal of Human Resources, Fall 1967, 461-74.

Gallaway, L. E., Gilbert, R. F., and Smith, P. E. "The Economics of Labor Mobility: An Empirical Analysis." Western Economic Journal, June 1967, 211-23.

Galle, Omar and Taeuber, Karl. "Metropolitan Migration and Intervening Opportunities." American Sociological Review, February 1966, 5-13.

Iden, George. "Unemployment Classification of Major Labor Areas 1950-65." Journal of Human Resources, Summer 1967, 375-391.

Laber, Gene. "Unemployment Classification of Major Labor Areas 1950-65: A Comment." Journal of Human Resources, Fall 1968, 515-519.

Lycan, Richard. "Interprovincial Migration in Canada: The Role of Spatial and Economic Factors." Canadian Geographer, Fall 1969, 237-54.

Mazek, Warren F. "Unemployment and the Efficacy of Migration: The Case of Labourers." Journal of Regional Science, April 1969, 101-108.

Nelson, Philip. "Migration, Real Income and Information." Journal of Regional Science, Spring 1959, 43-74.

Rabianski, Joseph. "Real Earnings and Human Migration." The Journal of Human Resources, Spring 1971, 185-92.

Raimon, Robert L. "Inter-state Migration and Wage Theory." Review of Economics and Statistics, November 1962, 428-38.

Schwartz, Aba. "On Efficienty of Migration." Journal of Human Resources, Spring 1971, 193-205.

Schwartz, Aba. "Interpreting the Effect of Distance on Migration." Journal of Political Economy, September 1973, 1153-69.

Sjaastad, Larry. "The Costs and Returns of Human Migration." Journal of Political Economy, October 1962, 80-93.

Stewart, Charles T. Jr. "Migration as a Function of Population and Distance." American Sociological Review, June 1960, 347-56.

Stouffer, Samuel A. "Intervening Opportunities and Competing Migrants." Journal of Regional Science, Spring 1960, 1-26.

Stromsdorfer, Ernest W. "Labor Force Adjustment to Structural Displacement in a Local Labor Market." Industrial Relations Review, January 1965, 151-65.

Vanderkamp, John. "Inter-regional Mobility in Canada: A study of the Time Pattern of Migration." Canadian Journal of Economics, August 1968, 595-608.

Vanderkamp, John. "Migration Flows, Their Determinants and The Effects of Return Migration." Journal of Political Economy, October 1971, 1012-31.

BOOKS

Karp, Herbert and Kelly, Dennis. Toward an Ecological Analysis of Inter-Metropolitan Migration. Chicago: Markham Publishing Company, 1971.

Kiker, B. F. (ed.). Investment in Human Capital. Columbia, South Carolina: University of South Carolina Press, 1971.

Lansing, John P., and Mueller, Eva. The Geographic Mobility of Labor. Ann Arbor: University of Michigan, Institute for Social Research, Survey Research Centre, 1967.

Lowry, Ira S. Migration and Metropolitan Growth: Two Analytical Models. San Francisco: Chandler Publishing Company, 1966.

Mazek, Warren. The Efficacy of Labor Migration with Special Emphasis on Depressed Areas. Ann Arbor: University Microfilms, 1966.

Schwind, Paul J. Migration and Regional Development in the United States 1950-1960. Department of Geography Research Paper No. 133. Chicago: University of Chicago, 1971.

Stone, Leroy O. Migration in Canada: Some Regional Aspects. 1961 Census Monograph, Dominion Bureau of Statistics, Ottawa: Queen's Printer, 1969.

GOVERNMENT PUBLICATIONS

U.S. Bureau of the Census, U.S. Census of Population: 1960 Vol. 1, Characteristics of the Population. Part 1, United State Summary, Washington D. C.: Government Printing Office, 1964.

__________ U.S. Census of Population: 1960. Subject Reports. Mobility for Metropolitan Areas. Final Report PC (2) - 2C. Washington, D. C. Government Printing Office, 1963.